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PROGRESS
The National Tool and Die Journal

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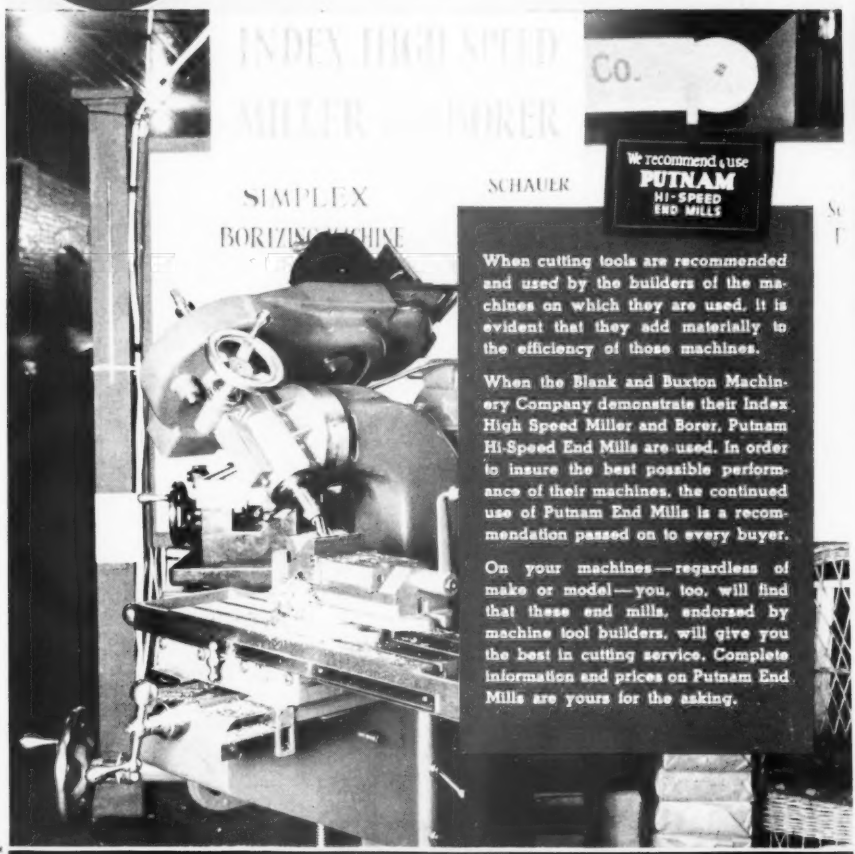

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MAY
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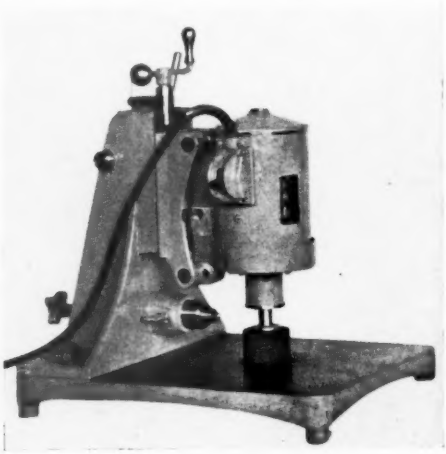

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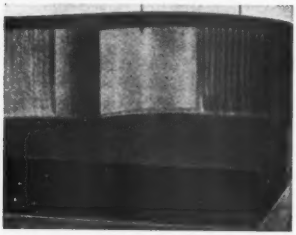

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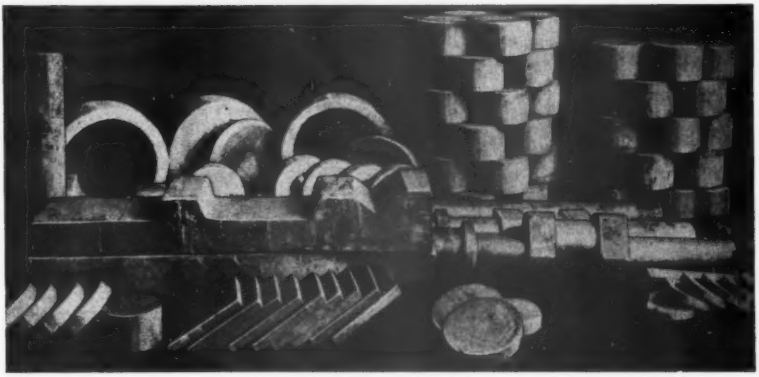

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Editor
George J. Huebner
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Official Organ of the Special Tool, Die and Machine Shop Institute

Vol. 6 **MAY, 1940** **No. 2**

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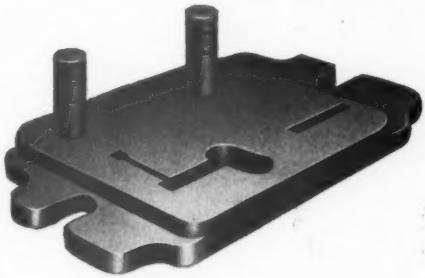

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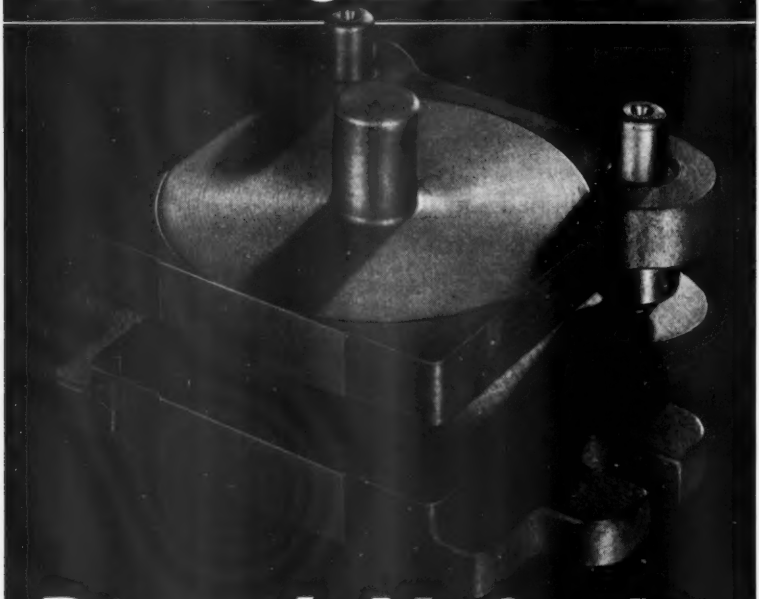

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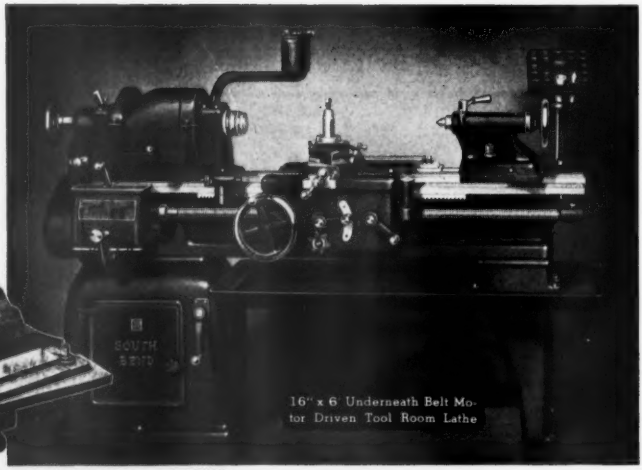

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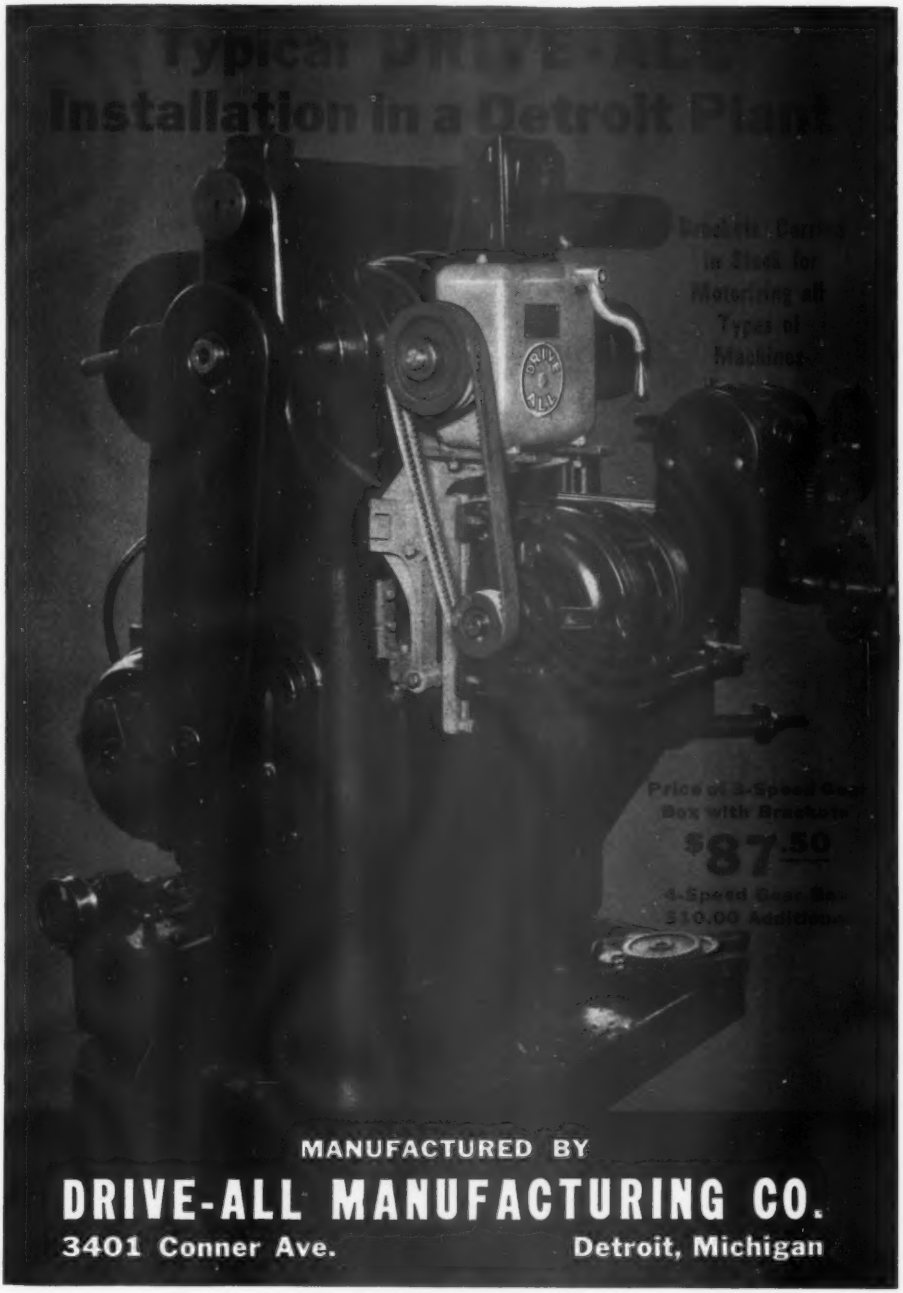
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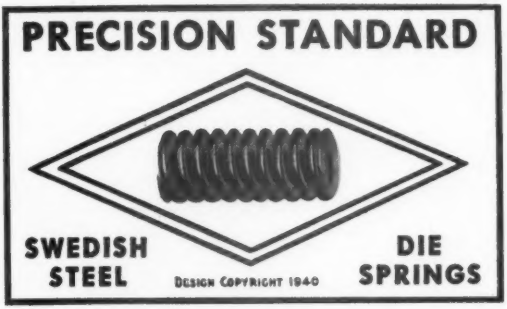

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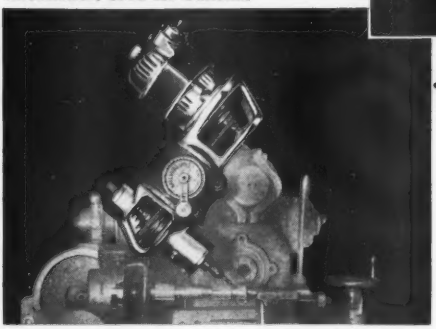

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TOOL · · DIE · · MACHINE
PROGRESS
The National Tool and Die Journal
May, 1940 Vol. 6, No. 2

Die Designing and Estimating

By CHARLES BOHMER
and
GEORGE DANNES

Article IV of a New Series

The type of die designed and estimated this month is adaptable to a great variety of parts. The part under consideration, a stud block support, is made from comparatively heavy material and is required in considerable quantities. Because the progressive pierce, blank and form die is an adaptable type, careful design and proper construction can result in very appreciable savings in both die and production costs.
—*The Editor.*

Design and Estimate of a Progressive Pierce, Blank and Form Die

Analysis of Design and Application of Method for Estimating Time Required to Machine and Assemble Parts

Design

A TYPE of die that is adaptable to making a great variety of parts should be of particular interest to die designers and builders because of its versatility of application. The progressive pierce, blank and form die designed here is of that type which is adaptable to the handling of a variety of blanks, and, if properly designed and constructed, will effect large die and production costs.

The part under consideration, a stud block support, is made from comparatively heavy material and production requirements are very high. With our die a complete part is made in one handling of the stock, resulting in marked reduction of production costs.

Several interesting features are used in this die such as returning the blank into the strip by means of the spring stripper (Detail 8) and the pad (Detail 6); the method of positive piloting on the lower pilots (Detail 5); and making use of the lower pilots as a primary stop.

The first station locates the strip

against the first front lower pilot. In this position all piercings take place and also part of the blanking punch trims the strip end so that there will be no interruption in the final station. The second station is against the second lower pin, a position in which the pilot holes of the first station line up with the pilots and in which a complete blank is cut and forced back into the strip. The third station does no work, the fourth and final position makes a complete blank. Thereafter, at each stroke a finished part is made.

The die blocks (Details 1 and 10) are two pieces to lessen the danger of error due to change in heat treatment and to permit completion of the forming section and development of blank without a tie up of the pierce and blank section. In other words, the form section may be made up completely hardened and mounted for tryout while the other section is left soft and machined after definite dimensions and contours are established.

The blanking and forming punches (Details 9 and 3) are mounted to the punch pad and are of such size and shape as developed and specified by the part drawing. In order to accomplish complete stripping of the part from the form punch a spring pin (Detail 25) is inserted.

The perforators and upper pilots are of the ground type and are inserted in the punch pads (Details 4 and 8); the lower pilots are inserted in the die. As will be noted, the upper pilots are directly in line with the lower ones and compress them so that as one leaves the material the other enters, assuring definite piloting at all times.

The stripper is under spring pressure as is the pad (Detail 6) in the blanking station. It must be remembered that complete success in forcing the blank back into the strip depends largely on sufficient spring pressure. The pad (Detail 2) in the forming station is spring actuated and is necessary both to hold the blank in position while forming takes place and in stripping the part from the die.

The front and back gages and back gage extension (Details 11 and 19) are necessary in guiding the material. Clearance for these must be provided for in the stripper.

In determining the location of the holes from center to center from left to right, it is necessary to consider the full dimension of the developed blank plus scrap allowance between blanks. The die is made to blank at an angle in view of stock savings and the center distance of pilot perforation and pilots must be maintained equal to the determined distance of blank centers.

As will be noted in the drawing of the part, the $\frac{7}{16}$" hole comes very close to the edge of the form and in some cases the distortion of the hole may be objectionable for this reason. A true development is necessary so that on forming, the correct diameter may be maintained.

The form die is worked to a correct corner contour, because of the thickness of the stock and shortness of the formed sides, allowing the punch to strike against the bottom and definitely setting the corners of the part.

It is sometimes advisable to provide a bumper or setting block to control the depth of entry of punch into the die. In this case control may be accomplished by the proper heights of the pads (Details 2 and 6).

The die set is a standard back leader pin type of the proper size and thickness to withstand severe use. All cutting and forming parts of the die including the pilots are of tool steel hardened and all other parts are of cold drawn or machine steel left soft.

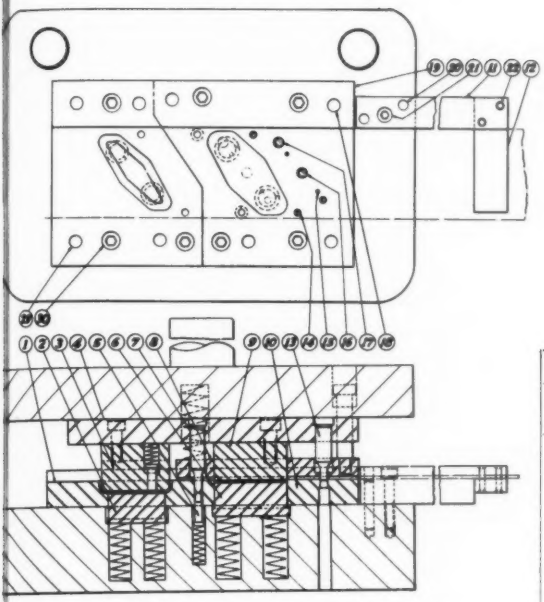
Estimate

MACHINING AND GRINDING

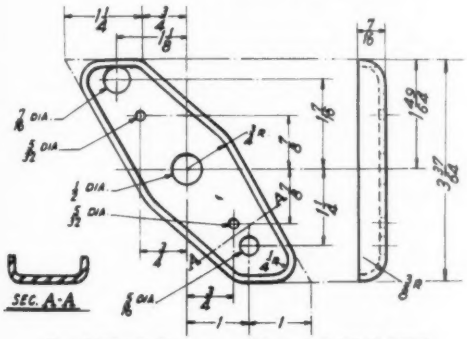
Column A—for time values see Table, Fig. 6.

	Machining hr.	Grinding hr.
DIE—Det. 1—1¼" x 7" x 9" TS	1.3	1.5
PAD — Det. 2 — 1½" x 1½" x 4" TS	.5	.7
PUNCH—Det. 3 — 2" x 4" x 5½" TS	.8	1.0
PUNCH PLATE — Det. 4—1¼" x 6" x 13¾" CRS	1.2	.7
PAD—Det. 6—2" x 2½" x 5½" TS	.8	1.0

Plan View of Die

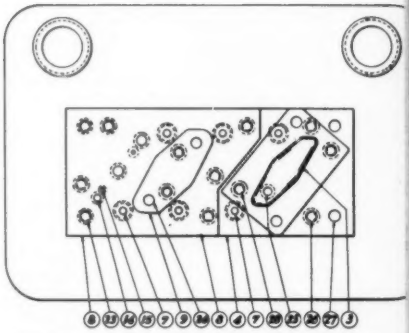


Section on Center Line of Die Assembly



Stud Block Support, Material .104" CRS

Plan View of Punch—Inverted



MATERIAL LIST

Det.	Req.	SIZE & MATERIAL	Remarks
1	1	1¼" x 7" x 9" DIE TS	Hdn. & Gr.
2	1	1½" x 1½" x 4" FORMING STA. PAD TS	" "
3	1	2" x 4" x 5½" FORMING PUNCH TS	" "
4	1	1¼" x 6" x 13¾" PUNCH PLATE CRS	
5	2	GAGE PINS	
6	1	2" x 2½" x 5½" BLANKING STA. PAD TS	Hdn. & Gr.
7	2	PILOT PINS	
8	1	¾" x 9" x 10" STRIPPER CRS	
9	1	2" x 2½" x 5½" BLANKING PUNCH TS	Hdn. & Gr.
10	1	1¼" x 9" x 10" DIE TS	" "
11	1	1½" x 1½" x 12" BACK GAGE CRS	
12	1	½" x 1½" x 5" STOCK REST CRS	
13	1	5/16" DIA. HOLE PUNCH	
14	2	5/16" DIA. PILOT HOLE PUNCHES	
15	2	5/16" DIA. HOLE PUNCHES	
16	1	½" DIA. HOLE PUNCH	
17	1	7/16" DIA. HOLE PUNCH	
18	4	½" DIA. x 2" DOWELS	
19	1	½" x 2" x 14⅜" BACK GAGE EXTENSION CRS	
20	2	⅜" DIA. x 1¼" DOWELS	
21	1	⅜"–16 x 1½" SOC. HD.SCR.	
22	2	¼" DIA. x 1¼" CRS	
23	4	⅜" x 3" STRIPPER BOLTS	
24	2	½" DIA. x 2½" DOWELS	
25	1	SPRING PIN	
26	5	¼"–13 x 2" SOC. HD. SCR.	
27	6	½" DIA. x 2" DOWELS	
28	2	¼"–13 x 1½" SOC. HD. SCR.	
29	4	½" DIA. x 1¼" DOWELS	
30	7	¼"–13 x 1¾" SOC. HD. SCR.	

Fig. 46. Progressive Pierce, Blank and Form Die, Designed by E. Taylor, Courtesy: Federal Tool Corp., Chicago.

STRIPPER — Det. 8 — ¾" x 9" x 10" CRS ..	1.2	.7	2½" x 5½" TS	.8	1.0
PUNCH—Det. 9—2" x			DIE—Det. 10—1¼" x 9" x 10" TS	1.7	1.9

BACK GAGE—STOCK-REST—Dets. 11, 12.. .5

8.8 8.5

TOTAL Column A ..... 17.3 hrs.

DRILLING ALL HOLES EXCEPT FOR PERFORATORS AND PILOTS

Column B—for time values see Table, Fig. 7.

DIE—Det. 1—3 screws, 4 dowels .8 hr.
PUNCH—Det. 3—2 screws, 2 dowels 5
PUNCH PLATE — Det. 4 — 6 screws, 4 dowels for mounting, 2 screws, 2 dowels for mounting punch Det. 3; 2 screws, 2 dowels for mounting punch Det. 9 ..... 1 9
STRIPPER—Det. 8—6 screws.. .7
PUNCH—Det. 9—2 screws, 2 dowels 5
DIE — Det. 10 — 4 screws, 4 dowels 9
BACK GAGE — Det. 11 — 1 screw, 2 dowels 4
DIE SHOE—7 screws, 6 dowels (1.6 hrs. + 100% for 3" thickness) 3.2
SPRING HOLES—Dets. 2, 6—4 for pads, 5 hrs. each ..... 2.0 (see Fig. 8)
PUNCH HOLDER—4 screws, 4 dowels + 100% for 2½" thickness for mounting punch plate 1.8
PUNCH HOLDER—6 stripper bolts + 100% 1.4

TOTAL Column B .....16.5 hrs.

LAYOUT AND INSPECTION

Column C — for contour time values see Tables, Figs. 9, 10, 11, 12.

Layout

DIE—Det. 1—14 units (see Fig. 9*) no lines are parallel and curve lines can be bored ..... 1.4 hrs.
DIE—Det. 10—14 units 1.4
Add Dets. 1, 10 (see plan view of Die, Fig. 46, time for offset contour must be included) 4

Inspection

PERFORATORS—Pilots
7 perforators 1.4
4 pilots 8

DIE—Det. 1 (see Fig. 10) 1.9
DIE—Det. 10 ..... 1.9

TOTAL Column C .....10.1 hrs.

MACHINING, FINISHING AND FITTING DIE PARTS

Column D—use contour units as established for Column C, also drawings and Tables, Figs. 13-20.

MATERIAL REMOVAL

DIE—Det. 1—(Fig. 14)—units	Machining and Finishing hrs.
14, size 8"	12.0
FINISHING—(Fig. 15)	1.0
DIE—Det. 1—(Fig. 19)—4 sq. inches x ½" deep, 1.2 hrs. + 300% for more than 13 units	4.8
PAD—Det. 2—units 14, size 8", type 2	12.0
PUNCH—Det. 3—units 14, size 8", type 1	7.0
+ 8 x .2 hrs. for forming radius (which is .2 hrs. per inch of length)	1.6
PAD—Det. 6—units 14, size 8", type 2	12.0
STRIPPER—Det. 8—units 14, size 8"	2.0
PUNCH—Det. 9—units 14, size 8", type 1	7.0
DIE—Det. 10—units 14, size 8"	12.0

FINISHING

MILLING IN DIE SHOE TO RECEIVE 2 PADS

PAD—Det. 2—4 sq. inches x $\frac{13}{16}$" deep 14 units would be as per table 5.1 hrs. (Fig. 19, value 1.7 x 300%) But since accuracy is not important table value is sufficient 1.7
PAD—Det. 6—(see note above) 1.2

TOTAL Column D .....74.3 hrs.

PERFORATORS, PILOTS AND THEIR CORRESPONDING HOLES

Column E—see Table and Drawings, Figs. 2-21-26.

PERFORATORS

PUNCH—Det. 13—Type 1 (1 required) (Fig. 22) 9
PUNCHES — Det. 14 — Type 2 (2 required) 1.4
PUNCHES — Det. 15 — Type 2 (2 required) 1.4
PUNCH — Det. 16 — Type 2 (1

*In "Die Designing and Estimating" (Advanced Series) page 14.

required) 9
PUNCH — Det. 17 — Type 2 (1 required) 9
PILOTS—Type 2 (4 required.) 2.8
PERFORATOR HOLES — (11 required) (Fig. 23) 9.9
SPRING PINS — (2 required) actual time 1.7 hr. each 3.4
BACK GAGE, STOCKREST, etc. 1.0

TOTAL Column E .....22.6 hrs.

DIE WORK ESTIMATING SHEET

	A	B	C	D	E	F
Det. 1 DIE	1.3 1.5	.8	1.9 1.4	4.8 12.0 1.0		1.5
Det. 2 PAD	.5 .7			1.7 12.0		.5
Det. 3 PUNCH	.8 1.0	.5		7.0 1.6		1.0
Det. 4 PUNCH PLATE	1.2 .7	1.9				2 0
Det. 6 PAD	.8 1.0			12.0 1.2		.5
Det. 8 STRIPPER	1.2 .7	.7		2.0		1.0
Det. 9 PUNCH	.8 1.0	.5		7.0		1.0
Det. 10 DIE	1.7 1.9	.9	1.4 1.9 .4	12.0		1.5
Det. 11, 12 BACK GAGE, STOCK REST	.5	.4			1.0	
DIE SHOE		3.2				
SPRING HOLES (Det. 2, 6)		2.0				
PUNCH HOLDER		1.8 1.4				
PERFORATORS			1.4 .8			.5 1.0 1.0 .5 .5
Det. 13 PUNCH					.9	
Det. 14 PUNCHES					1.4	
Det. 15 PUNCHES					1.4	
Det. 16 PUNCH					.9	
Det. 17 PUNCH					.9	
PILOTS					2.8	
PERFORATOR HOLES					9.9	
SPRING PINS					3 4	
DEVELOPMENT (Form)						4.0
TRYOUT						4.0
	17.3	16.5	10.1	74.3	22.6	20.5

Total 161.3 hrs.

Fig. 47

ASSEMBLY, TRYOUT, DEVELOPMENT
Column F (see Table, Fig. 28 and accompanying text)
DIE—Det. 1 ..... 1.5 hr.
PAD—Det. 2 5
PUNCH—Det. 3 ..... 1.0
PUNCH PLATE — Det. 4 (assembled) 2.0

(Continued on Page 48)

PLASTIC MOLD DESIGNING

By GORDON B. THAYER
Plastic Design Engineer
General Industries Company

Article III of a Series

This article describes and illustrates the design of a split cavity mold for a coil spool. Designers are urged to study the detail drawing carefully in order to appreciate the importance of specifications of corner radii in this type of design.

In the June issue Mr. Thayer will discuss a cooling fixture for this coil spool.
—*The Editor.*

The Design of a Split Cavity Compression Type Mold

THE part shown in Fig. 4, a coil spool for electrical purposes, is to be molded of a thermosetting material in a single cavity mold. Because of the flanges on both ends, it is necessary to employ a split cavity mold.

An essential feature of the design is the specification of corner radii. This information for all corners is very important to the mold designer because the corner construction influences the design, and cost, of the mold. The .005" radius on the inside corners of the spool allows the corners of the core block to be smoothed, and at the same time makes the molded part or casting stronger by eliminating sharp corners for stress concentration. The radius on the outside corners makes easier machining of the cavity blocks, and eliminates the possibility of hardening cracks in the steel. The optional radius at the ends allows the core block to be machined from the solid, since a square corner here would mean that the core block must be made in two pieces, with loss of rigidity.

The mold as shown in Fig. 5 consists of the split cavity blocks (detail 4), circular in form, as shown in the plan view. The blocks are tapered where they fit in the chase (detail 7), which is square. The chase is made of tool steel, and is hardened. In this case, a tool steel chase is more economical than using a machine steel chase, which must have a hardened ring fitted to chase and cavity blocks. The size, type of mold, material to be molded and molding requirements all must be considered in the choice of the chase material. Both the tapered bore and the straight bore of the chase are ground to fit the cavity and core blocks. The chase is to be clamped to a supporting plate and the force (detail 13) is to be screwed to a top steam plate. These plates carry the guide pins. The cross section is not a true section, as some of the parts have

(Continued on Page 24)

The Design of a Split Cavity Mold

(Fig. 5 below)

1. Dowel pin to locate core block. One pin.
2. Tapped and counterbored hole to hold cavity blocks together while being machined. Two holes.
3. Dowel pin to align the halves of the cavity block. Two pins.
4. Split cavity block halves.
5. Hold-down pins. Four pins.
6. Cavity entering-guide pin. One pin.
7. Chase.
8. Steam line.
9. Clamping slot.
10. Cap screw to hold down core block. Two screws.
11. Knockout pin. Four pins.
12. Core block.
13. Force.

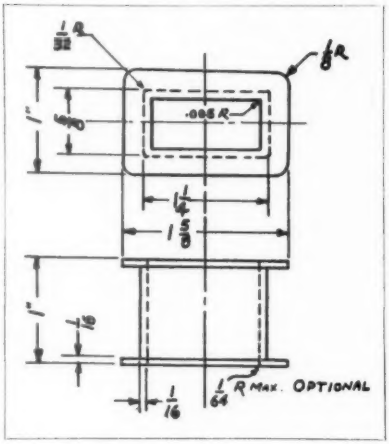


Fig. 4. Part Drawing

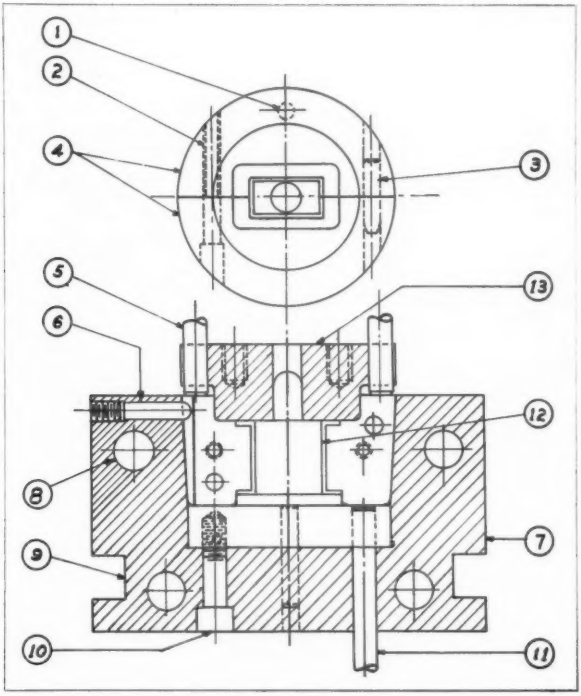


Fig. 5. Mold Assembly

been rotated into the cutting plane, in order to show them more conveniently.

The Cavity Blocks

Two rectangular blocks of mold steel are ground on their mating faces, and are screwed and dowelled together. Two screws (detail 2) and two dowels (detail 3) are used. The blocks are then separated, and the rectangular hole is cut in each block. No draft is required, in any direction, since the part is small, and the casting will be soft enough to allow removal of the blocks when they come out of the chase. The blocks are then put together, and the material well and flange portions are machined out. Lastly, the taper is turned, after which the blocks go to the hardening furnace.

After hardening, the taper and the material well are ground. The "match" of the cavity along the parting line may have to be fitted to compensate for any hardening warpage, after which the cavity is polished. Dowel pins are fitted to the blocks for operating use. The original holes used for machining are used, and the pins are pressed into one block, and are tapered slightly on the other end in order to facilitate assembly in operation. These dowel pins may be omitted, but they serve to protect the lower corners of the square hole which fit over the square part of the core in the lower flange portion. Also, the dowel pins insure that the parting of the cavity halves will be in a straight line, and will thus prevent bending or distorting the flanges as the halves are separated.

The lower edges of the cavity blocks are rounded in order to assure easy entrance into the chase, and proper entering on the rectangular portion of the core block. A groove is cut along one side of a cavity block to fit the guide pin (detail 6). This pin aligns the cavity blocks with the core, and further protects the corners of the mold parts. The groove in the cavity block is not shown in the plan view.

The Core Block

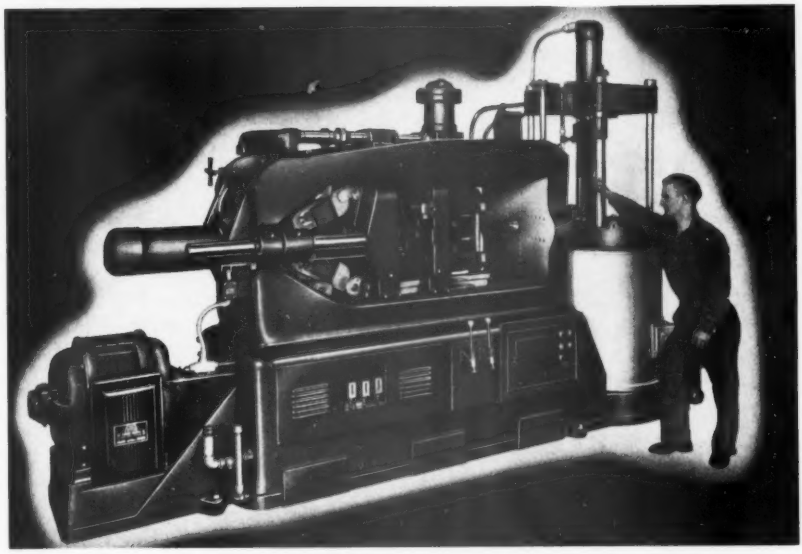
The core block (detail 12) is machined from a solid block of mold steel. It is turned and ground to a press fit in the lower part of the chase. This part is not tapered. Two cap screws (detail 10) hold the block in place. Since both chase and core are to be hardened, a soft plug is fitted in the chase for dowelling. The core block is reamed for the dowel (detail 1) before hardening, and then the dowel hole is drilled in the chase plug after the chase is hardened. The core block has a rectangular pilot at the lower end to engage the cavity blocks, and a round pilot at the top, to guide it into the force. These pilots prevent any tendency toward bending of the *core* block which would result in uneven wall thicknesses.

The Force

The force (detail 13) is made from a round block of mold steel. It is tapped for fastening to the top steam plate. Slots are cut in the outer edge to allow passage of the hold-down pins (detail 5). Four pins are used to hold the cavity blocks down in their proper place. This is necessary because the molding powder will heap in the material well and will begin to flow as soon as the descending force exerts some pressure. If the cavity blocks are not properly seated, material will flow between them, preventing proper closing. The force has a pilot hole reamed to fit the pilot on the core block. This hole must run all the way through the force and through the steam plate in order to allow any molding material which may get in to escape. Otherwise, the material would soon fill a blind hole, and the operating pressure would break the core block. The outside of the force is ground to fit the material well in the cavity.

The Chase

The chase (detail 7) is made from a rectangular block of mold steel. This simplifies mold construction, since the alternate choice would be to use a hardened ring in a soft chase. The chase is machined and drilled for steam supply. Clearance holes are provided for the knockout pins (detail 11). They are arranged to be slightly below the bottom of the cavity blocks when the mold is closed. This allows them to be made more economically since they need not be made exactly to length. The chase is hardened and ground to fit the cavity blocks and core.



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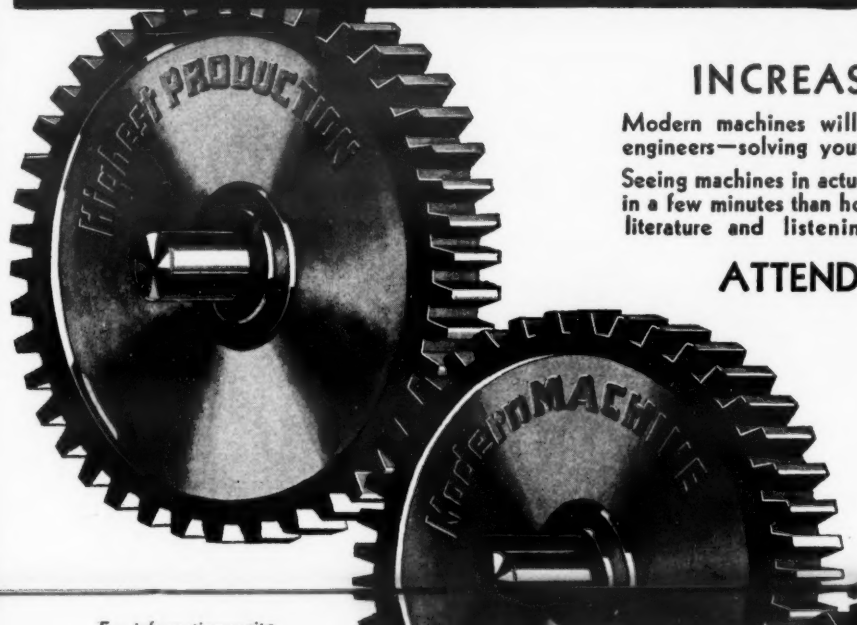

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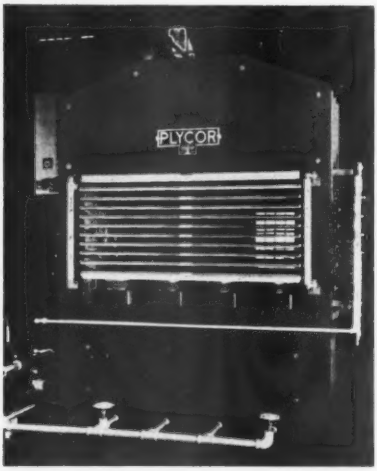
Three New Applications Demonstrate Versatility of Meehanite Castings

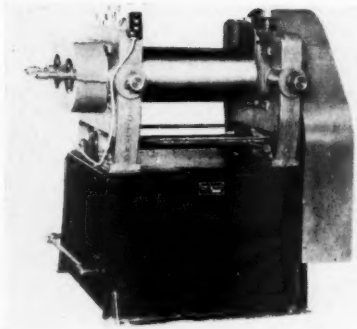
THREE widely divergent problems, as detailed below, were successfully solved by specific Meehanite castings chosen for controlled mechanical properties. Twenty different Meehanites are available under four general classifications—general engineering, wear resisting, heat resisting and corrosion resisting castings.

The Adamson Machine Co. of Akron, Ohio, in designing the Plycor Hot-Plate Plywood Presses for their associate, the Plycor Company of Chicago, Illinois, was faced with the problem of maintaining an overall accuracy of thickness to within .005". Pressure tightness of the press rams and cylinders, a vital factor in design and selection of materials, had to be maintained steadily. To



reduce the wear on both rams and cylinders in service to the lowest possible minimum, wear resistant Meehanite castings were chosen. The rams were hardened by heat treatment to approximately 425 Brinell. The combination of the heat treated rams and the bearing surface of the Meehanite cylinders have resulted in practically negligible wear.

Stewart Bolling and Company of



Cleveland, Ohio, manufacturers of rubber mills, had the problem of providing a roll of superior strength with very low deflection and high hardness. Meehanite wear resistant roll castings were chosen for various units up to the 10" x 24" mill illustrated. They were heat treated for hardness by quenching and drawing much the same as high carbon steels are heat treated for high hardness. These rolls required only about half as much crowning as chilled rolls, reducing stress in the rolls and lessening the hazard of fatigue breakdown. The resulting hard, tough surface results in longer service life.

Rolls were rough machined before heat treating (1600° F., oil quenching, drawing at 350° F., gives average hardness of about 78 scleroscope). The rolls were then ground to mirror finish and hand rubbed before installation.

The Centrifix Corporation of Cleveland, Ohio, manufacturers of purifying equipment, experimented extensively for cast parts that would give increased

wear and erosion resistance as well as reduced corrosive action and higher strength. Meehanite castings of the properly balanced properties were chosen after severe testing for many cast parts in the Centrifix tuyere unit. As the illustration shows, stainless steel tuyere blades were cast directly into the tuyere casting. The Centrifix purifying units are used in steam, vapor, gas, and air lines in standard sizes and with working pressures from 125 to 250 lb. p.s.i.

Meehanite Research Institute of America, Inc., 311 Ross St., Pittsburgh, Pa., publishes a number of Bulletins on specific applications of various grades of Meehanite. The Bulletin covering your requirements will be sent on request.

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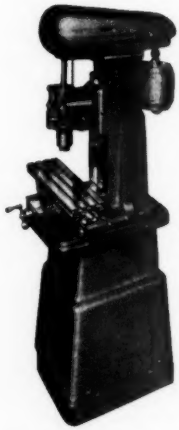

Known as the Vernon Combination Vertical Milling Machine and Jig Borer, this equipment will take work of a considerable range, with a maximum distance of 10½" from top of the table to bottom of spindle. A slow hand feed, actuated by a hand wheel graduated to .001" is provided. A rapid one-to-one traverse may be quickly engaged to increase speed for drilling operations, or milling out cavities in dies, molds or similar jobs.

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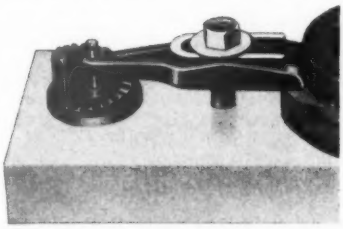
THE K-O Adjustable U-Clamps employ a new adjustment feature, a ratchet or step elevation base, to utilize the old style U-Clamp principle quickly and easily. The rear of the clamp is simply adjusted to the level of the work to be clamped by turning the ratchet one way or another. Three point contact insures uniform pressure. The K-O Adjustable U-Clamps are self contained, require no blocking and are a real time saver for clamping dies, fixtures and work of all kinds on punch presses, drill presses, milling and many other machines.



The K-O Clamps are available in three open-end sizes, two closed-end and one finger style.

Write for new Circular "P" on K-O Adjustable U-Clamps, (illustrates, describes and prices) to K-O Products Co., Benton Harbor, Mich.

New Vertical Mill and Jig Borer

(from Page 30)

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For full specifications and further details, write the Machinery Manufacturing Co., Dept. P, P. O. Box 155, Vernon Branch, Los Angeles, California.

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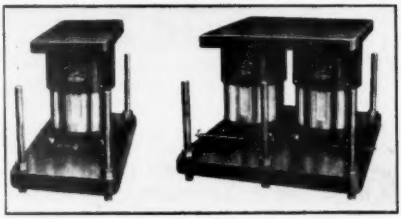

other necessary equipment, ready to install. When the cushions are not needed, such as for blanking and piercing work, and when the cushion is not under air pressure, the cylinder may be bled, allowing the pin plate to drop down or retreat to the bottom of the maximum drawing capacity—thus allowing the blanks and slugs to drop through the free opening in the bolster plate. If used on an inclinable press, they will automatically drop off the pin pressure pad into receivers below the press.

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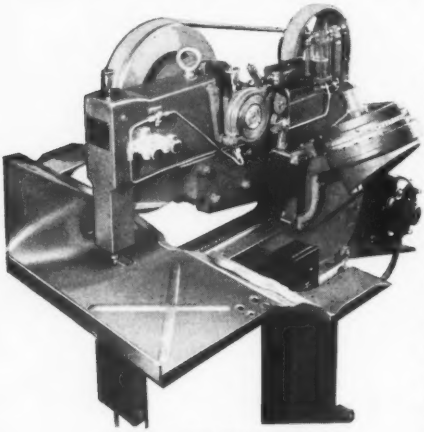

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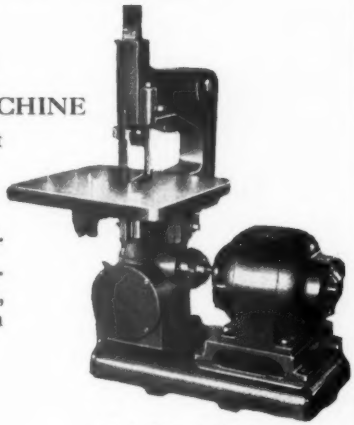

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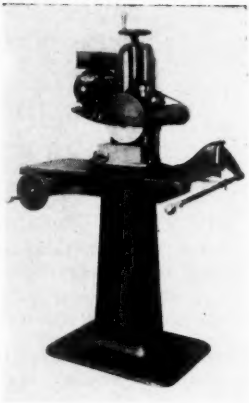
BUILDERS Iron Foundry has recently introduced an entirely new hand-operated utility Surface Grinder, a radical departure from the conventional design of grinding machines in that its construction eliminates the intermediate table. The table of the Builders "T" Surface Grinder rests directly on the plane ground surface of the bed and is guided longitudinally and laterally by a T-square action control. The cross feed nut is attached to the head of the T-square. Both screw and nut as well as the T-square and other bearing surfaces are completely protected from dust by the large apron on the table.



The construction of Builders "T" Surface Grinder makes it possible to obtain unusual accuracy and finish, the company states, since there is no play to affect the thickness of the work and there is but one oil film subject to the grinding pressure. Quick set-up and flexibility makes the Builders "T" Surface Grinder particularly valuable in work on tools, dies and small machine parts. The ease of operation permits

(Continued on Page 41)

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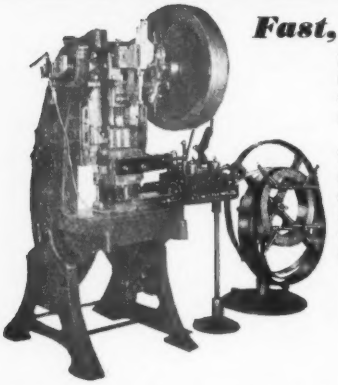

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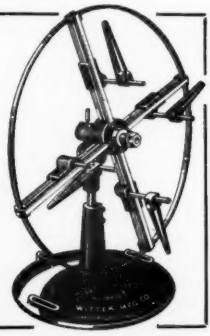

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● This directory of products lists for ready reference the names of manufacturers and dealers whose sales to Tool·Die·Machine PROGRESS readers have established them as dependable in every sense of the word. They merit your consideration.

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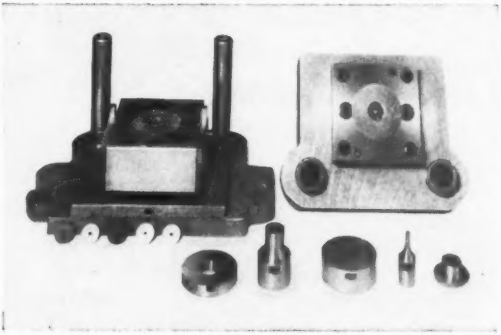

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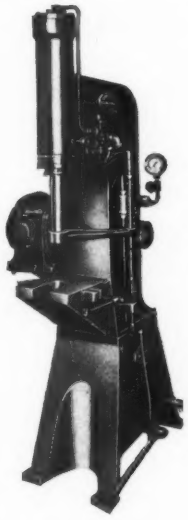

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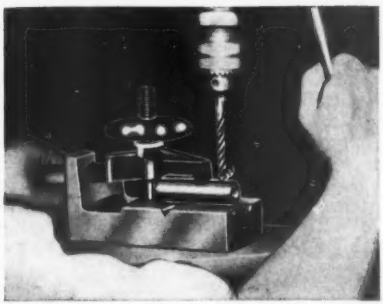

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Kiffer Tool & Die Co., 5601 Tillman Ave., Cleveland, Ohio.

TOOLS—Carbide Tipped
McKenna Metals Co., 500 Lloyd Ave., Latrobe, Pa.

TOOL CHESTS
Gerstner Tool Chests, 56 Columbia St., Dayton, Ohio.

TUBING—Tool Steel
Bissett Steel Co., The, 947 E. 67th St., Cleveland, Ohio.

TYPE HOLDER
H. O. Bates, 251-257 North Broad St., Elizabeth, N. J.

VALVES—Operating
Hanna Engineering Works, 1759 Elston Ave., Chicago, Ill.
Ross Operating Valve Co., 6478 Epworth Blvd., Detroit, Mich.

WASHERS—Special
Detroit Stamping Co., 3443 West Fort St., Detroit, Mich.
H. K. Metal Craft Corp., 387 Second Ave., New York, N. Y.

WELDING
Danly Machine Specialties, Inc., 2121 So. 52nd Ave., Chicago, Ill.
Star Tool & Die Works, 2522 24th St., Detroit, Mich.

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Knu-Vise, Incorporated, 6433 Cass Ave., Detroit, Michigan.

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T-Square Surface Grinder

(Continued from Page 34)

an operator to work all day without tiring. No time is wasted by overstroking, too rapid or too slow travel.

The unique design, a result of forty years of grinder manufacturing experience, embodies a bed of box construction assuring rigidity and preventing distortion. The upright has three ground ways to which the saddle is clamped when in grinding position. For rough adjustment, the saddle clamp screw is loosened, permitting movement with a minimum of effort. After clamping, the final wheel adjustment is made by a micrometer handwheel, moving the spindle housing about its pivot in the saddle. The weight of the driving motor holds the spindle housing against the micrometer adjusting screw eliminating backlash. The spindle is equipped with a tapered bronze bearing at the front and a radial ball bearing at the rear. Adjustment for wear is extremely simple—an adjusting nut is brought up against a vertical shoulder and thereby returns the spindle to its proper position in the tapered bearing.

Builders "T" Surface Grinders are so moderately priced that many shops install them at several places in the shop convenient for tool and die makers who frequently have small grinding jobs to do.

For a copy of Bulletin No. N-644, giving full information on Builders "T" Surface Grinders, write Builders Iron Foundry, Providence, Rhode Island.

Allegheny Ludlum Opens New San Francisco Warehouse

Allegheny Ludlum Steel Corporation announces the opening of a new district warehouse at 36 Berry Street, San Francisco, with P. R. Thurston, district manager of sales, in charge. Ample space is provided for stocks of bar and sheet steels used by fabricators on the Pacific Coast. An innovation in delivery of all polished bars is of interest. Bars are delivered in special made canvas bags, insuring delivery with finish unmarred, even by finger marks. Every facility, including phone order service, is now available to Pacific Coast users of Allegheny Ludlum Steel products from this warehouse.

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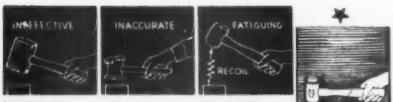

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WOOD
makes a clumsy tool that will split and crack.

METAL
has edges that turn, break and fly off.

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makes a bouncing head that chips and smears.

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heads and faces stay accurate, absorb shock and wear longest.

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• This hammer and mallet with genuine rawhide heads are quality tools for thrifty mechanics. Sold by industrial supply houses everywhere.

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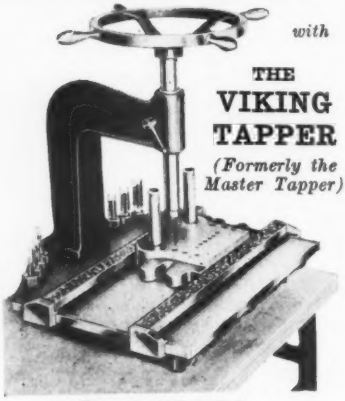


with
THE
VIKING TAPPER
(Formerly the Master Tapper)

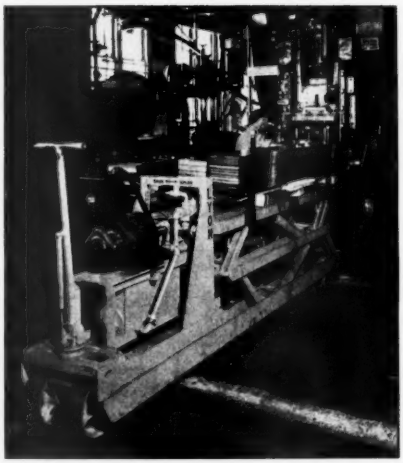
Capacity ¼" to ⅞"
Send for Circular

The Viking Tool & Machine Corp.
6 Main St. Belleville, N. J.

New Lyon Sheet Handling Truck with Hydraulic Elevating Table

THE problem of keeping sheets of steel at convenient heights for operators in feeding sheet metal machines such as shears, presses, etc., was solved by the Lyon Iron Works, Greene, N. Y., by the use of their new Lyon Sheet Handling Truck with Hydraulic Elevating Table.

This truck is of the Toggle Lever



Type and the table is elevated through the means of four hydraulic rams or hoists, pressure for which is furnished by a hydraulic pump driven by a 2 HP motor. The lowering of the table is facilitated, particularly when empty, by a separate hydraulic ram. This truck is also available with a hand operated single speed or a two-speed hydraulic pump.

The Lyon Sheet Handling Truck, illustrated, is loaded with steel sheets in front of a press ready for feeding into the press. The sheets have been placed on the table of the truck by a power fork tiering truck. The illustration shows a 6,000-lb. capacity truck, table 20" x 84", lowered height 22", elevated height 40".

The control of the motor driven hydraulic pump for lowering and elevating the table is placed close to the operator

(Continued on Next Page)

When you order or write about products described in TDM PROGRESS please mention the publication.

Lyon Sheet Handling Truck

(Continued from Page 42)

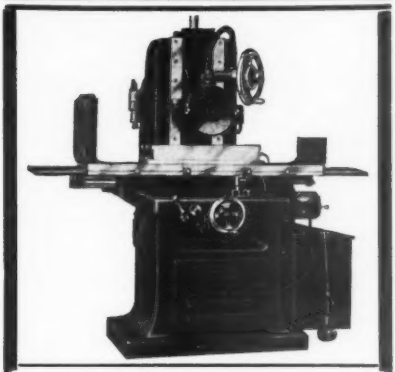
so that he can conveniently keep the load of sheets at the proper height for easily feeding the press.

The Lyon Sheet Handling Truck is available in several sizes to fit almost any stamping press room handling problem. Lyon also manufactures a Hydraulic Die Handling Truck and other trucks with Hydraulic elevating tables.

For complete information on the Lyon Sheet Handling Truck or new circular No. 115—"Lyon Trucks with Hydraulic Elevating Tables," write Lyon Iron Works, 516 Madison St., Greene, N. Y.

Carpenter Tool Steel Stocks Now Available in Dayton

The Carpenter Steel Company of Reading, Pa., announces that a complete line of Carpenter Tool Steels is now available at Dayton, Ohio. A warehouse stock will be carried by Industrial Steel Service (Warehouse Division), The Dayton Fabricated Steel Co., at 1300 East Monument Ave. T. H. Barlow and H. E. Burns, who cover the Dayton industrial area, will be in charge.



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Combine Speed and Precision

Sizes from 6"x10"x18" to 30"x25"x144"

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UNRETOUCHED photograph above shows a KENNAMETAL shaper tool which was used daily for two weeks in shaping manganese silicon steel of 30 Rockwell "C" hardness. Note that the KENNAMETAL tip is not shattered or broken but is merely worn a little on the cutting edge. It has had many useful re-grinds during its life.

You, too, can be sure of dependable performance . . . and great savings in machining costs . . . by specifying KENNAMETAL-tipped tools for your steel-cutting jobs.

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BUSHINGS

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"Let us be your tool room."
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GRINDERS
12" by 100" Cylinder
16" by 36" Surface
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*THE HAMILTON TOOL COMPANY
220-222 North B Street
Designers and Builders of
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The Hamilton Portable Elevating Table

(Directory Continued on next page)

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Whether you use one or a thousand—our Patented Process can save you
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SPECIAL SIZES! No DIE Cost 24 HOURS SERVICE!
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(Continued from Page 45)

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Let us quote on producing machine parts for you. We are equipped to do GENERAL MACHINE WORK *of all types.*

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Extensive experience in the design of high production progressive and compound dies, also production tools to suit quantity requirements. Consulting and design service on dies, tools, special machinery. Commercialization of inventions. *Quotations on design or tool costs for stampings furnished on request.*

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RAPID ACTION TOGGLE CLAMPS
Model "C"
KNU-SINE

Illustration shows two Model CPM Toggle Clamps used to hold drop forgings in milling machine—one of the many applications shown in our new Catalog No. 4. Write for your copy today.
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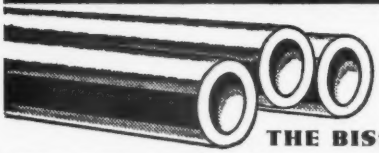
Coast stock—1178 Heliotrope Drive, Los Angeles, Cal.—Phone OL 3662

Jessop Steel Issues Bulletin on 3-C Die Steel

Jessop Steel Company of America, Washington, Pa., has issued a new bulletin on their 3-C Die Steel, a new high carbon-high chrome steel. The combination of extreme hardness and great toughness makes this steel of special usefulness for cold stamping and cold forming dies, threading and drawing dies, punches, taps and reamers. The bulletin gives forging, annealing, hardening and tempering data with tables, and lists examples of records made with 3-C Die Steel in a number of varied applications. Similar data is also given for Jessop C.N.S. (high carbon Chrome-Molybdenum) Air Hardening Die Steel.

For a copy of 3-C Die Steels Bulletin "P", write Jessop Steel Company of America, Washington, Pa.

OIL HARDENING TOOL STEEL TUBING

Substantially reduces labor costs by eliminating the expensive procedure of drilling from the solid.
BISCO TOOL STEEL TUBING is a fine grade tool steel in tubular form available in sizes up to 14" diameter and 2" wall thickness; other sizes to your specification.
Tool Steels Alloy Steels Stainless Sheets and Bars
THE BISSETT STEEL COMPANY 947 E. 67th St., Cleveland, Ohio

New Method Announces Novel Annular Type Marking Device

New Method Steel Stamp Company announces a new marking device of unusual design for marking of such annular parts as gears, bushings, bearings, etc., in quantity production. The new holder eliminates the usual set-screws, etc., required to hold removable type in place, and is particularly effective in marking parts requiring a considerable number of characters in a limited space, due to the compactness of the assembly.

The new type holder is a device consisting of 5 basic parts—(1) a central flanged shaft, (2) a hardened and ground annular anvil disc, (3) a snap ring in a groove machined in the shaft for locating the type through grooves cut in the type, (4) an outer spring-steel split sleeve which holds the type in place, and (5) the type holder body.

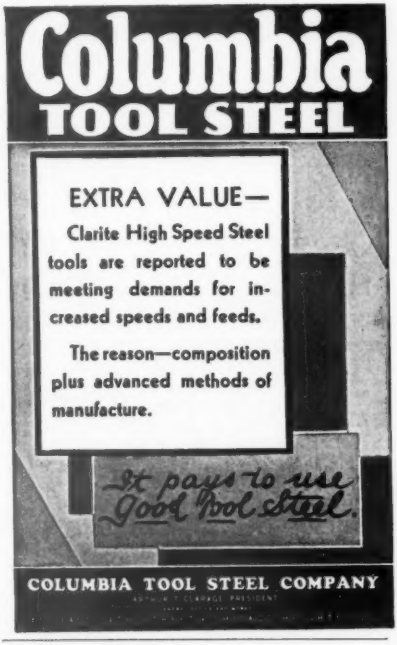
The shaft shank of the inner assembly is ground with an angular flat to provide a positive locking device. To change type, a set-stud is unscrewed, permitting removal of the inner assembly from the type holder body. The split sleeve is spread and slipped downward. After inserting type, over the snap ring, the sleeve is slid back up, the entire assembly is reinserted in the holder and the single set-stud tightened. The end of the central shaft extends beyond the type holder to act as a locating pilot in marking annular parts.

To mark a part, the holder is merely placed on or against the part with the shaft in the bore of the piece. The end of the holder is then given a sharp blow with a hammer.

For further information, write New Method Steel Stamps, Inc., 149 Joseph Campau, Detroit, Mich.

Phoenix Machine Opens Addition

The new plant addition of the Phoenix Machine Company of Cleveland, manufacturers of Lester Die Casting and Plastic Injection Molding Machines, has been occupied by the Company. The area is sufficient to almost duplicate the company's floor space, and it is estimated that the greatly increased space, particularly for assembling of machines, will enable the company to increase its output by approximately 50 per cent.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Clarite High Speed Steel tools are reported to be meeting demands for increased speeds and feeds.
The reason—composition plus advanced methods of manufacture.
It pays to use Good Tool Steel
COLUMBIA TOOL STEEL COMPANY

MORE WORK

Because of the many exclusive features in the Lufkin Master Planer Gage, it handles jobs for which ordinary gages are unsuited. It can be used as an Adjustable Parallel; with an Indicator in transferring measurements; with a Sine Bar in grinding angles, and with Gage Blocks in building up work on a surface plate.

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Free Catalog

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In their 33 years of invaluable service to the mechanics of America, Gerstner Tool Chests have proven beyond question their dependability.

GERSTNER TOOL CHESTS
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Die Designing and Estimating

(Continued from Page 21)

PAD—Det. 6	.5	PERFORATOR—Det. 16 (1 required)	.5
STRIPPER—Det. 8	1.0	PERFORATOR—Det. 17 (1 required)	.5
PUNCH—Det. 9	1.0	DEVELOPMENT (Form)	4.0
DIE—Det. 10	1.5	TRYOUT	4.0
PERFORATOR—Det. 13 (1 required)	.5	TOTAL Column F	20.5 hrs.
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WALTON TAP EXTRACTORS

Walton alloy steel "fingers", which fit the flutes of the tap, grip and back out the broken piece quickly, easily and without damage to threads.

World-wide acceptance for 30 years proves the value of Walton Tap Extractors.

Stock sizes from No. 4 machine screws to 1½". In 2, 3 or 4-flute types.

Write for Circular 131. Select your sizes and put them to work at our risk.

THE WALTON CO.
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They save time in setting up cutters on milling machines and other tools. Will help you get work out quicker. Low in cost, but high in savings. Standard stock sizes from .001" to .125" thick. Also specials up to 4.000".

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Enough spacers for average use on one machine, sent for $1.00. Give arbor size when ordering.

Price list No. 70 sent free

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3443 Fort St., West Detroit, Mich.

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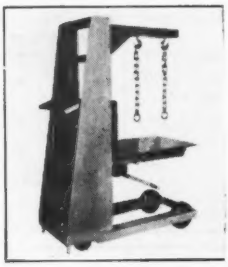

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Available in several sizes and capacities.

Lyon also manufactures *Hydraulic* Lift Trucks for skid platforms and for single or double faced pallets, *Hydraulic* Sheet Handling Trucks.

Descriptive circular on request

LYON IRON WORKS

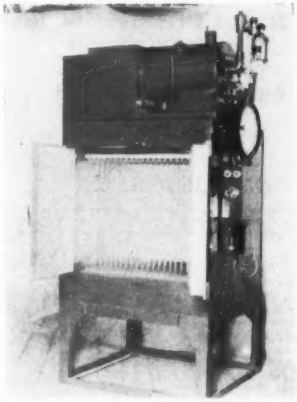
MATERIAL HANDLING EQUIPMENT

516 MADISON STREET GREENE, N. Y.

Despatch Introduces New Gas Tempering and Drawing Furnace

The Despatch Oven Company of Minneapolis, Minn., announces a new tempering and drawing gas furnace equipped with the new Despatch Controlled Combustion Air Heater. The illustration shows a top mounting of the high temperature, high capacity fan to supply heat to the furnace chamber. A uniform heat to 3 to 5° plus or minus is obtained with very rapid heat transfer. Horizontal air flow design can also be provided.

The grilles shown in the illustration were for band saw blade coils and are removable. Any or several holding or suspending racks are available for small part tempering and drawing. This type of furnace will supply a maximum of 1250° F. and is available in any size to order. The furnace is furnished with recording temperature control (or any standard control) and full safety equipment. The Despatch External Heater with Controlled Combustion and heavily insulated walls assure economical operation. Side seeing doors with special



heat seal arrangement as shown, or lift doors, are optional. The Despatch Oven Company has been a leading manufacturer of industrial ovens and furnaces for 38 years.

Additional information on the Despatch Tempering and Drawing Furnace will be furnished gladly on request. Write Despatch Oven Company, 602 S. E. Ninth St., Minneapolis, Minn.

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The ILLINOIS Die Filing Machine is built to produce more accurate filing work. Vibration is eliminated by perfectly balanced moving parts, hardened and ground to minimize wear. Accuracy is maintained with bronze bushings for all running parts; holding chucks and clamping device provide positive file alignment. Write for descriptive literature today.

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Precision Boring and Internal Threading with

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Style A, plain boring tools, particularly efficient on lathes, are guaranteed to give consistent performance. Shanks never require renewing.

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Write for bulletin with prices

BOKUM TOOL CO., INC. 51 W. Hancock St. Detroit, Mich.

Style C

DIE DESIGNING AND ESTIMATING

by Charles Bohmer and George Dannes

Book 1 DESIGNING, by Bohmer. A concise, authoritative treatise on the design of many of the commonly used types of dies. **$1.00, postpaid.**

Book 2 ESTIMATING, by Dannes. A complete, fast and accurate Estimating Method. Includes Supplement of Tables of Time Values for quick, easy reference. **$1.55, postpaid.**

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12 Spindle Continuous Rotary Drilling Machine

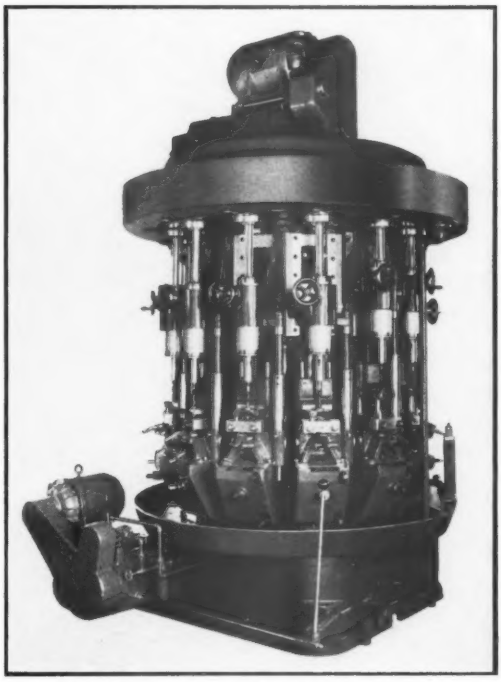

Photo shows machine with splash guard removed

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